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Harnessing the role of insulin-like growth factor in glioblastoma: a comprehensive review

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Abstract

This review provides an overview of the biological function of the insulin-like growth factor (IGF) system in glioblastoma (GB) development and a thorough examination of its therapeutic relevance. Networks of microRNAs regulated by insulin-like growth factor 1 (IGF-1) that impede GB's response to temozolomide (TMZ). The amounts of PDGFR, IGF1R, PI3K, and ERK1/2 proteins and their potential as therapeutic targets. Anti-epidermal growth factor receptor (EGFR) agents may encounter significant resistance from IGF-R inhibitors that operate via PI3K signaling pathways. Insulin-like growth factor-binding protein (IGFBP)-2 modulates CD24, hence increasing the invasiveness of GB cells. 5) Due to the proliferation, invasion, and chemotherapy resistance of GB cells when exposed to exogenous IGFBP-2, targeting the integrin β1/ERK signaling pathway may serve as an effective therapeutic strategy for GB treatment. The IGFBP-2/integrin/ILK/NF-κB network functions as a biologically active signaling pathway in vivo, facilitating the proliferation of GB. Activation of the Hedgehog (HH) pathway and overexpression of the downstream effector GLI1 accelerate glioma tumorigenicity and the biology of glioma stem cells (GSCs). The aggressive nature of gliomas is attributed to PTEN failure and elevated levels of IGFBP-2 expression. IGFBP-2 augments the expression of CD144 and MMP2, promoting the development of vasculogenic mimicry (VM) in GB cells. Recent investigations have revealed a crucial signaling mechanism that is vital for the survival of GB patients.

Keywords: Glioblastoma; Insulin growth factor; Insulin-like growth factor-binding protein; Survival; miRNA.